

## Claims

- Sub a<sup>7</sup>
1. Hybrid synchronous motor with toroidal winding comprising:  
a rotor and a stator,  
the stator having at least one assembly (7) of coaxially  
displaced ferromagnetic rings (2, 3) which are cogged both on inner  
and outer circumferences thereof, and  
the assembly (7) being provided with a polyphase toroidal coil  
(6) made of coil segments so that a coil wire is lying between cogs (2a,  
3a, 2b, 3b).
  2. A hybrid synchronous motor according to claim 1, wherein a  
plurality of the stator assemblies (7) have a common toroidal coil  
which is formed around all of them simultaneously, and wherein the  
common toroidal coil is wound around or assembled from U-shaped  
copper parts.
  3. A hybrid synchronous motor according to claim 1 or 2, wherein  
one pair of inner and outer rotor assemblies (16a, 16b) is mounted to  
each stator assembly (7), each stator assembly including two  
coaxially displaced rotor rings (17a, 18a or 17b, 18b), each rotor ring  
is being formed with rotor poles in the form of cogs which are equally  
spaced along a circumferential direction, so that the poles of each of  
the rotor rings (17a, 17b) are angularly shifted for one half of rotor  
pole division relative to the poles of the other corresponding one of  
the rotor rings (18a, 18b), respectively.
  4. A hybrid synchronous motor according to any one of claims 1  
to 3, wherein  
either one axially magnetized disk is inserted between the

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cogged stator rings (2, 3) of each assembly (7), or two such disks are inserted between the adjacent cogged rotor rings (17a, 18a) and (17b, 18b), and wherein

the disk or the disks are producing transverse magnetic flux in  
5 the inner and in the outer air gaps between the rotor and stator.

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5. A hybrid synchronous motor according to any one of claims 1 to 4, wherein

four sets of rotor poles (19a, 19b, 20a, 20b) have the same  
10 number of poles, and four sets of stator poles (2a, 3b, 3a, 3b) also have the same number of poles, but these two numbers slightly differ if the stator poles are equally spaced along a circumferential direction.

15 6. A hybrid synchronous motor according to claim 1, wherein the gaps between rotor and stator are filled with a liquid, preferably ferromagnetic liquid which improves heat transport from motor interior and reduces mechanical vibrations.

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